I CLAIM:

1. A device comprising:

a magnetic sensing structure having a stripe height and a stripe width defining an area for a current flowing therethrough; and

at least one electrode positioned adjacent an edge of the magnetic sensing structure for adjustably controlling the area of the magnetic sensing structure through which the current can flow.

2. The device of claim 1, wherein the magnetic sensing structure includes top and bottom surfaces defining a path for the current flowing therethrough, the device further comprising a layer of material selected from the group consisting of semiconductors and semimetals disposed on at least one of the top and bottom surfaces of the magnetic sensing structure, wherein the at least one electrode is provided on the layer of semiconductor/semimetal material adjacent an edge of magnetic sensing structure.

3. The device of claim 2, wherein applying a voltage to the at least one electrode creates a depletion region in the layer of semiconductor/semimetal material prohibiting the flow of current therethrough such that the area of the magnetic sensing structure through which current will flow is controllably adjustable by controlling the voltage applied to the at least one electrode.

4. The device of claim 2, wherein if the semiconductor/semimetal material comprises a semimetal, the semimetal is selected from the group consisting of Bi, Sb, As, and alloys thereof, and

wherein if the semiconductor/semimetal material comprises a semiconductor, the semiconductor is selected from the group consisting of Si, Ge, GaAs, InAs, InP, InSb, and alloys thereof.

5. The device of claim 1, wherein the device is included in a sensor selected from the group consisting of CPP, CIP, GMR multilayer, spin-valve and tunnel junction sensors.

6. A device comprising:

a magnetic sensing structure having front, back, top, bottom and side surfaces, the front and back surfaces defining a stripe height of the magnetic sensing structure and the side surfaces defining a stripe width of the magnetic sensing structure, the stripe height and stripe width defining an area for a current flowing through the magnetic sensing structure along a path defined by the top and bottom surfaces;

a layer of material selected from the group consisting of semiconductors and semimetals provided on at least one of the top and bottom surfaces of the magnetic sensing structure; and

at least one electrode disposed on the layer of semiconductor/semimetal material and positioned adjacent at least one of the back and side surfaces of the magnetic sensing structure,

wherein a voltage applied to the at least one electrode creates a depletion region in the layer of semiconductor/semimetal material prohibiting the flow of current therethrough such that the area of the magnetic sensing structure through which current will flow is controllably adjustable.

7. The device of claim 6, wherein as the voltage applied to the at least one electrode increases the depletion region in the layer of semiconductor/semimetal material increases such that the area of the magnetic sensing structure through which current will flow decreases.

8. The device of claim 6, wherein if the semiconductor/semimetal material comprises a semimetal, the semimetal is selected from the group consisting of Bi, Sb, As, and alloys thereof, and

wherein if the semiconductor/semimetal material comprises a semiconductor, the semiconductor is selected from the group consisting of Si, Ge, GaAs, InAs, InP, InSb, and alloys thereof.

9. The device of claim 6, wherein the layer of semiconductor/semimetal material comprises a first layer of semiconductor/semimetal material provided on the top surface of the magnetic sensing structure, and wherein the at least one electrode comprises first and second electrodes disposed on the first layer of semiconductor/semimetal material and positioned adjacent the side surfaces of the magnetic sensing structure such that the stripe width of the magnetic sensing structure is controllably adjustable by controlling the voltage applied to the first and second electrodes.

10. The device of claim 9, wherein the layer of semiconductor/semimetal material further comprises a second layer of semiconductor/semimetal material provided on the bottom surface of the magnetic sensing structure, and wherein the at least one electrode further comprises third and fourth electrodes disposed on the second layer of semiconductor/semimetal material and positioned adjacent the side surfaces of the magnetic sensing structure such that the stripe width of the magnetic sensing structure is further controllably adjustable by controlling the voltage applied to the third and fourth electrodes.

11. The device of claim 6, wherein the layer of semiconductor/semimetal material comprises a first layer of semiconductor/semimetal material provided on the top surface of the magnetic sensing structure, and wherein the at least one electrode comprises a first electrode disposed on the first layer of semiconductor/semimetal material and positioned adjacent the back surface of the magnetic sensing structure such that the stripe height of the magnetic sensing structure is controllably adjustable by controlling the voltage applied to the first electrode.

12. The device of claim 11, wherein the layer of semiconductor/semimetal material further comprises a second layer of semiconductor/semimetal material provided on the bottom

surface of the magnetic sensing structure, and wherein the at least one electrode further comprises a second electrode disposed on the second layer of semiconductor/semimetal material and positioned adjacent the back surface of the magnetic sensing structure such that the stripe height of the magnetic sensing structure is further controllably adjustable by controlling the voltage applied to the second electrode.

13. The device of claim 6, wherein the device is included in a sensor selected from the group consisting of CPP, CIP, GMR multilayer, spin-valve and tunnel junction sensors.

14. A magnetic reader including a magnetic sensing structure having a stripe height and a stripe width defining an area for a current flowing therethrough, the magnetic reader comprising:

a layer of material selected from the group consisting of semiconductors and semimetals provided on a surface of the magnetic sensing structure along a plane generally parallel to a plane of the area defined by the stripe height and stripe width of the magnetic sensing structure; and

at least one electrode disposed on the layer of semiconductor/semimetal material and positioned adjacent an edge of the magnetic sensing structure,

wherein a voltage applied to the at least one electrode creates a depletion region in the layer of semiconductor/semimetal material prohibiting the flow of current therethrough such that the area of the magnetic sensing structure through which current will flow is controllably adjustable.

15. The magnetic reader of claim 14, wherein if the semiconductor/semimetal material comprises a semimetal, the semimetal is selected from the group consisting of Bi, Sb, As, and alloys thereof, and

wherein if the semiconductor/semimetal material comprises a semiconductor, the semiconductor is selected from the group consisting of Si, Ge, GaAs, InAs, InP, InSb, and alloys thereof.

16. The magnetic reader of claim 14, wherein as the voltage applied to the at least one electrode increases the depletion region in the layer of semiconductor/semimetal material increases such that the area of the magnetic sensing structure through which current will flow decreases.

17. The magnetic reader of claim 14, wherein the magnetic sensing structure includes front, back, top, bottom and side surfaces, the front surface defining an air bearing surface, the front and back surfaces defining the stripe height, the side surfaces defining the stripe width, and the top and bottom surfaces defining a path for the current flow, wherein the layer of semiconductor/semimetal material comprises a first layer of semiconductor/semimetal material provided on the top surface of the magnetic sensing structure, and wherein the at least one electrode comprises first and second electrodes disposed on the first layer of semiconductor/semimetal material and positioned adjacent the side surfaces of the magnetic sensing structure such that the stripe width of the magnetic sensing structure is controllably adjustable by controlling the voltage applied to the first and second electrodes.

18. The magnetic reader of claim 17, wherein the layer of semiconductor/semimetal material further comprises a second layer of semiconductor/semimetal material provided on the bottom surface of the magnetic sensing structure, and wherein the at least one electrode further comprises third and fourth electrodes disposed on the second layer of semiconductor/semimetal material and positioned adjacent the side surfaces of the magnetic sensing structure such that the stripe width of the magnetic sensing structure is further controllably adjustable by controlling the voltage applied to the third and fourth electrodes.

19. The magnetic reader of claim 14, wherein the magnetic sensing structure includes front, back, top, bottom and side surfaces, the front surface defining an air bearing surface, the front and back surfaces defining the stripe height, the side surfaces defining the stripe width, and the top and bottom surfaces defining a path for the current flow, wherein the layer of semiconductor/semimetal material comprises a first layer of semiconductor/semimetal material provided on the top surface of the magnetic sensing structure, and wherein the at least one electrode comprises a first electrode disposed on the first layer of semiconductor/semimetal material and positioned adjacent the back surface of the magnetic sensing structure such that the stripe height of the magnetic sensing structure is controllably adjustable by controlling the voltage applied to the first electrode.

20. The magnetic reader of claim 19, wherein the layer of semiconductor/semimetal material further comprises a second layer of semiconductor/semimetal material provided on the bottom surface of the magnetic sensing structure, and wherein the at least one electrode further comprises a second electrode disposed on the second layer of semiconductor/semimetal material and positioned adjacent the back surface of the magnetic sensing structure such that the stripe height of the magnetic sensing structure is further controllably adjustable by controlling the voltage applied to the second electrode.

21. A method of adjustably controlling the stripe height and/or stripe width of a magnetic sensing structure, the strip height and stripe width defining an area for a current flowing through the magnetic sensing structure, the method comprising the steps of:

providing a first layer of material selected from the group consisting of semiconductors and semimetals on a surface of the magnetic sensing structure which includes the stripe height and strip width;

providing a first at least one electrode on the first layer of semiconductor/semimetal material and positioned adjacent an edge of the surface of the magnetic sensing structure which includes the strip height and stripe width; and

selectively applying a voltage to the first at least one electrode to selectively create a depletion region in the first layer of semiconductor/semimetal material prohibiting the flow of current therethrough such that the stripe height and/or stripe width of the magnetic sensing structure are selectively controllable by controlling the voltage applied to the first at least one electrode.

22. The method of claim 21, further comprising of the steps of:

providing a second layer of material selected from the group consisting of semiconductors and semimetals on an opposite surface of the magnetic sensing structure which also includes the stripe height and stripe width;

providing a second at least one electrode on the second layer of semiconductor/semimetal material and positioned adjacent an edge of the opposite surface of the magnetic sensing structure which includes the stripe height and stripe width; and

selectively applying a voltage to the second at least one electrode to selectively create a depletion region in the second layer of semiconductor/semimetal material prohibiting the flow of

current therethrough such that the stripe height and/or stripe width of the magnetic sensing structure are selectively controllable by controlling the voltage applied to the second at least one electrode.

23. The method of claim 22, wherein the steps of selectively applying a voltage to the first and second at least one electrodes comprises that steps of:

reading back known data previously written to a recording medium; and

adjusting the applied voltages during the readback of data to maximize the signal-to-noise ratio and/or the bit error rate of the readback signal.

24. In a disc drive including a magnetic recording head having a read sensor, the read sensor comprising:

a magnetic sensing structure having a stripe height and a stripe width defining an area for a current flowing therethrough; and

at least one electrode positioned adjacent an edge of the magnetic sensing structure for adjustably controlling the area of the magnetic sensing structure through which the current can flow.